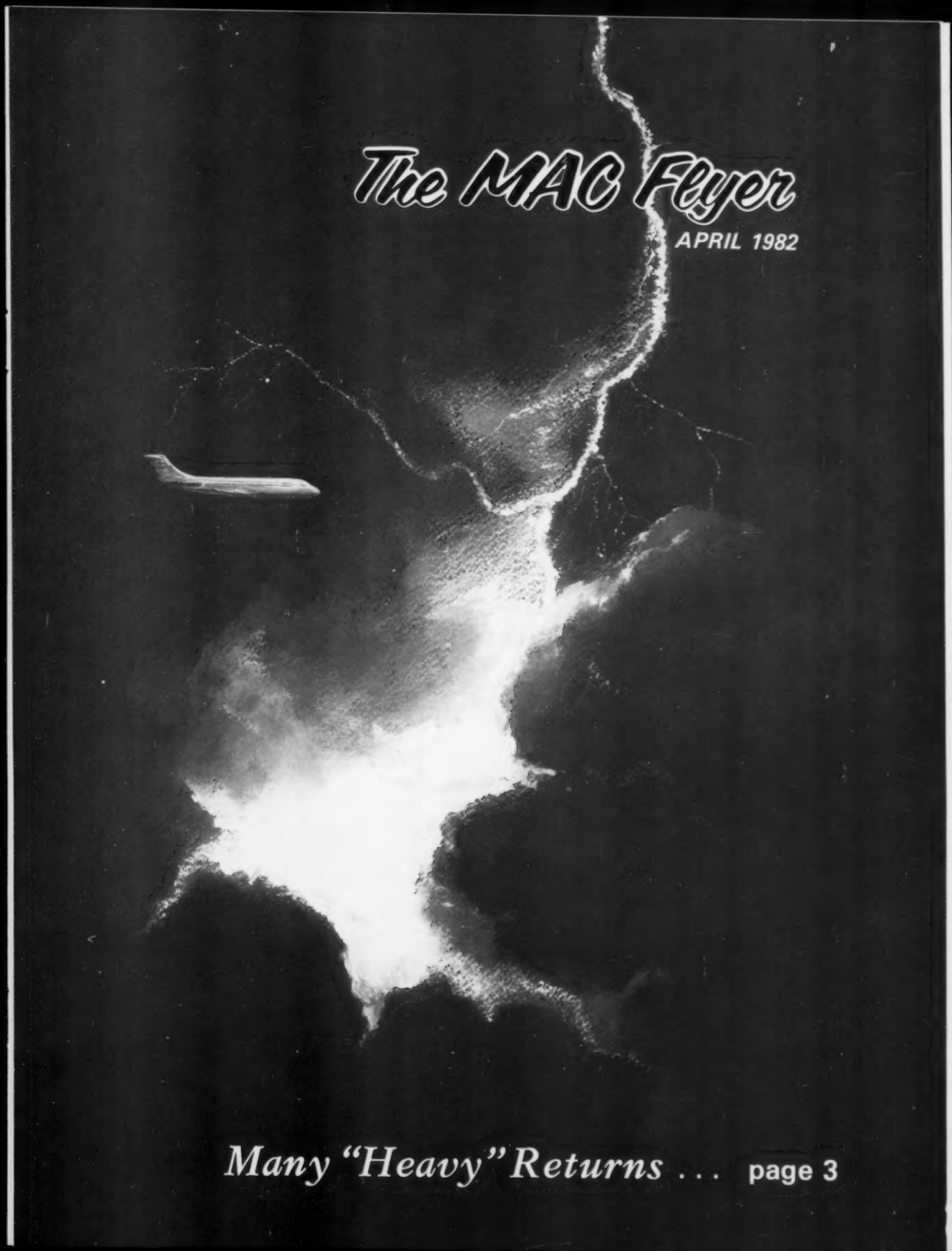

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APRIL 1982

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The MAC Flyer

MILITARY AIRLIFT COMMAND

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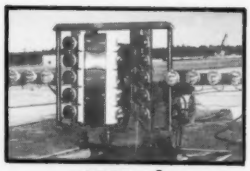
For Greater Safety and Efficiency in MAC Air Operations.

MACRP 127-5 APRIL 1982 VOL XX IX NO. 4



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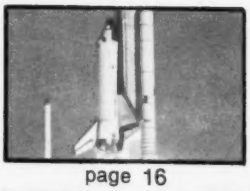

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The MAC Flyer is published by the Directorate of Safety, Military Airlift Command, and is authorized until 26 Oct 1983, unless authorized to continue before that date. The contents are informative and not regulatory or directive. Names of people and places in mishap stories are fictitious; photos in mishap stories are representative and not necessarily of the aircraft or equipment involved. Information in any article may not be construed as incriminating under Article 31, UCMJ.

Contributions, comments and criticisms are welcome. Write: *The MAC Flyer*, HQ MAC/IGFE, Scott AFB, IL 62225; or call 618-256-3534 or autovon, 638-3534. The editors reserve the right to make any editorial changes in manuscripts which they believe will improve the material without altering the intended meaning.

Subscriptions are available from: The Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Price: $2.50 per copy, $17.00 per year (foreign address $3.15 per copy, $21.25 per year). Changes of address for subscription mailing should be sent to GPO; give old and new address, including zip codes. USAF Active and Air Reserve Forces units establish requirements for this magazine through their publication distributor (DAPD). Other U.S. Military units should consult administrative directives. *The MAC Flyer* is published at an approximate ratio of one magazine for every five MAC aircrew members, and one for every twenty MAC support personnel.

Distribution F, X; OPR: HQ MAC/IGFE
ISSN 0024-788X

Just before the radar failed the nav's scope was full of . . .

Many "Heavy" Returns

by Captain Byron L. Howard
Associate Editor

I wandered into the squadron ops center late that hot June morning having flown one of those infamous "local tac trainers" the night before. My poor, tired body still had not recovered from the previous night's gaggle, but I decided to stop by our scheduling board nonetheless. But before I had a chance to throw my hat on the counter the young duty officer hit me with my next mission.

"Gee, Buzz. You're flying with a real 'stick' tomorrow." I perused the board to find my name next to one Paul Pressman, who was to be my AC for a little 3-day JA/ATT mission. From all the stories I had heard about Pressman's pilot skills, the young duty officer was right. Paul was known to be a "stick" in the truest sense of the word. Even though he had only been in the C-130 for less than 6 months, his fame as a superb pilot had become almost legendary. Some of the instructors at Little Rock had even gone so far as to call him a natural pilot. To many, he was the preferred kind of guy to fly with. In fact, he breezed through the phase I course as if he studied under Leo Sullivan. I silently wondered, though, why he had been passed over for major. And he hadn't upgraded very fast even though he'd been an IP and stan-eval pilot in T-29's. Obviously the Air Force hadn't realized what a good officer it had in Pressman.

The rest of the crew looked just as capable. Both the engineer and the loadmaster were knowledgeable and easy to work with—true professionals. Our navigator, Capt Bray, was also in that mold and even though he was in our wing stan-eval shop, his easy-going manner never underscored the fact. His finesse with the APQ-122 was almost as legendary as Paul's hands were at the yoke of the H-model. I took one last look

at the alert time and told the duty officer to mark me "notified."

Trips come and trips go, as they say, and this one promised to be about as interesting as watching a pig sunning itself on a hot Texas afternoon. Well, at least the first two legs were dull. In fact they turned out to be the hours and hours of boredom before the moments of stark terror we flyers are always talking about. Still, it was good to fly again, even on a prepositioning leg. On this JA/ATT mission we had landed at Fort Campbell AAF, Kentucky. After a short stop at the ALCE, we were on our way downtown.

"You know, it's really a wonder we didn't run into any thunderstorms, today," I reflected to J.B. (That's short for Jim - Bob.)

"You've done it now, son," chastised our friendly nav. "You realize now because you've said it, we'll probably run into thunderstorms all day tomorrow."

I started getting this funny feeling in the pit of my stomach.

"Can you guys hold down the noise for a minute while I give you the word about tomorrow? The only change is the alert time. Sleep tight tonight, guys. We don't take off until 1000 local." Nothing wrong with that, I thought. I'll vote for bankers hours every time. J.B., on the other hand, realized the ominous overtones of such a simple revelation.

"You mean to say we'll be arriving back at Campbell around 1700 or 1800 tomorrow afternoon?" he asked.

"That's right, nav, unless you can think of a way to put 'after-props' on a Herk." Paul's wit was almost as quick as his hands.

"Son, I mean, you realize that's going to put us in here about the time a front is scheduled to move through," announced J.B., "and you know what that means—thunderstorms with a capital C, capital B!" Jim-Bob hated the thought of flying anywhere near thunderstorms. Seems he had been caught in the same line of C.B.'s that had spelled doom for a DC-9 outside Atlanta some years back and that was close enough for him.

"Well as long as your radar is up and working what's the problem?" asked Paul.

"I'll tell you what's the problem," J.B. suddenly got a semi-serious look on his face that hushed everyone on the bus. "Our radar is nothing to brag about. Fact of the matter is, it's nearly gone. If we had stayed with our original frag, we would have made it in here ahead of the front."

"Well, can't our maintenance people fix it before we leave?" I asked.

"What are they going to fix?" J.B.'s glare automatically told me I had said something foolish. "It works great on the ground, but it starts to fade once we take off."

"Well," I countered, finally starting to use my head, "we could always stop at the 'home drome' on the way back from Biggs. After all, it's right on our route of flight."

"Whatever!" Paul began to get a little impatient with the conversation at that point. "We'll wait and see, but it will be my decision. Let's go driver."

I awoke at my standard time the next morning to be greeted, as usual, by Willard Scott and his view of the weather. Unfortunately, the weather was about as pure as month-old snow in February. Just as we all had feared, (all of us except Paul, that is), a big, ugly front was scheduled to move through and place itself between West Texas and the Mississippi River for our return. J.B. had also seen the weather. I knew it the moment I stepped on the bus.

"Son! Did you see the weather forecast this morning?" he asked with his usual furrowed brow. Silently I nodded my head. Then, I started getting this funny feeling in the pit of my stomach.

The mission began as smoothly as the previous day's leg. And it continued to go smoothly until we started back from Biggs. Just past the "home drome," I contacted our crack weather forecasters to see if they had an update on the weather between us and our Kentucky destination. That bad feeling in the pit of my stomach suddenly became worse as the weather forecaster gave us the bad news.

"Uh, roger MAC 77," he began hesitantly, "uh there's been some reports of a string of tornadoes from the upper Mississippi Valley along a line through Louisiana and continuing out into the Gulf. Tops reported as high as flight level 500." I couldn't find the courage to ask him anything else until I knew how the radar was working. J.B. anticipated my question.

"Don't bother asking, copilot," he said. "This radar has been coming on and going out at its leisure." I turned around long enough to get a

quick glance of his dejected eyes, then asked the AC what he thought.

"Ask metro if there's any hope of finding a hole through that stuff."

I asked. There wasn't.

By this time we were almost out of range of our home base and closing in on the line of severe weather at 6 miles per minute. Seems we had about 40 knots on the tail when we needed it least. I remember looking back at Jim-Bob just before we hit the squall line to see him frantically twisting every knob on the set.

"Request flight level 350, copilot." I looked at utter disbelief at Paul, my brain not believing what my ears had just heard. The nav took it much worse.

"Pilot, nav, are you out of your mind?" Jim-Bob was starting to get a might irritated with Paul's "hack-the-mission-at-all-cost" attitude. Come to think of it, we *all* were becoming concerned.

And still we pressed on.

"Hey, you guys, calm down. The last report of an airliner I just heard ahead of us said he had just skirted the tops at FL330."

"Pilot, engineer. Sir, I hate to put a damper on your plans, but we won't be able to make 35,000 at our weight and the present temp dev."

Paul's answer was terse. "Well that's just wonderful," he said. Still we pressed on, and just before we hit the front, J.B. gave us the word.

"Crew, navigator. The radar is completely gone. Be advised the last picture I had showed many 'heavy' returns from 340° all the way around to 170° going up clean off my tilt."

"How far in front of us was that buildup?" asked the engineer. The nav's response was short and to the point.

"Fifteen miles!"

When you're in IMC in a C-130 most turbulence hits you with an unwanted jolt and this one was no exception. That first sudden downdraft hit the Herk with enough force to drive me up into my shoulder straps and then leave me there for a good 4 or 5 seconds. Then just as suddenly, an updraft hit the airplane's belly and drove me down so hard I thought I was going clear through my seat. Somehow the engineer had managed to blurt out our charted thunderstorm penetration speed and Paul pulled the throttles back and flipped off the altitude hold. I watched as the altimeter unwound crazily and our vertical gyrations became known to ATC via our mode 3C.

"MAC 77, Memphis Center. Are you guys having any problems up there?" Okay, Paul, I thought to myself. This is your big chance to play the hero and do a "one-eighty," but it was too late for that now.

"Negative Memphis," the pilot answered. "Just a little turbulence." The left-seater's flair for understatement was incredible. I began to see why he had been passed over for major. For the next 20 minutes we were pounded and beaten by the furious storm. The only miracle was that we made it through the tempest without taking a lightning strike or breaking apart. When we finally punched out into a strikingly clear star-lit night, I felt like we had just walked backward out of the gates of Dante's inferno.

When we landed about 30 minutes later, I fully suspected the engineer would find a very beat-up, bent-up Herk. While getting out of the seat, I glanced at Paul just in time to see him punch the g-meter to zero. Before that, however, I had seen the upper and lower limits of our brush with the thunderstorm—a -1 and +2.5. I lingered behind to watch the engineer complete his postflight inspection.

"How's it look?" I asked.

"Well, Sir," his voice amazingly calm and full of wonder, "I've been through Korea and Vietnam. I've been shot at, shot up and shot through. But as long as I live I hope I never see another ride like that in *this* plane." Then he shook his head, picked up his bags and walked to the waiting crew bus shouting over his shoulder, "Not one panel missing. Not one!"

Paul Pressman left the Air Force a while after that incident, the "victim" of another passover for major. Jim-Bob Bray went on to be an instructor at another flying outfit somewhere in sunnier climes. The engineer and loadmaster are still back at the "home drome," recounting this story to each and every one of their students. And the copilot? Well, the last I heard, he had taken up writing about some of his flying experiences for a well known flying safety publication, hoping somehow that others will see the light before needlessly sacrificing themselves (and others) to stupidity.

A U.S. Navy landing signal officer and pilot describes the . . .

Fresnel Lens Optical Landing System

by Lt Angelo J. Spadaro, U.S. Navy
VAQ-33, NAS Key West, Florida

MAC aircrews today operate in and out of a variety of naval aviation facilities while performing their global airlift mission. Conspicuously absent from most naval air stations is the familiar VASI system that is common equipment on most Air Force runways. What most pilots may have noticed is a curious conglomeration of lights, wires and magic that is part of a Navy optical landing system. HQ MAC/DOV has authorized MAC aircrews to use a fresnel lens optical landing system (FLOLS) as an additional approach aid at Diego Garcia in the Indian Ocean. This article is not designed to make OLS experts of MAC pilots, but to help you safely use the FLOLS as an additional approach aid at this remote Navy base. —Ed.

The fresnel lens optical landing system is designed to provide visual glide slope information to pilots. The origin of the fresnel lens glide slope data is an internal light source which is projected through a series of lenses. The glide slope is referred to as the "ball" or "meatball" and is designed to provide pilots with a representation of their position relative to a prescribed optimum glide slope.

Besides the meatball there are three other principal elements in the OLS system: the datum lights, the wave-off lights, and the cut lights. The datum lights are a horizontal row of green lights located on either side of the meatball. They provide a reference for aligning the ball to maintain the proper glide slope. Figure 1 depicts high, low and on-glide slope presentations. The wave-off lights used to order a go-around are arranged in two vertical columns, one on either side of the meatball. They are red in color and when activated by the landing signal officer (LSO) or tower, they flash, directing the pilot to begin a go-around. Many of the units also include cut lights which, when installed, are another horizontal row of green lights located above the wave-off lights and the ball. They are only used when an LSO is on station and controlling the system.

The fresnel lens system is currently the primary visual landing aid (VLA) aboard all U.S. Navy carriers and at most of the shore installations. Diego Garcia is equipped with one of the newer model fresnel systems. The FLOLS consists of five separate center cells with each containing an individual light source. The top four cells project the amber-colored

meatball. The bottom cell projects a ball that is red or flashing red in color. Red was chosen for the bottom cell to aid in rapid recognition of an unsafe low-on-glide slope condition by the pilot at extreme ranges. Outside 1 to 1½ miles, definition of the ball deteriorates and detection of slight deviations from the desired glide slope is difficult.

The fresnel lens glide slope information is visible through a wide horizontal range of 20° on each side of center (40° total) but only through a very restricted vertical range of 1½° (¾° above and below established glide slope). Because the 1½° presentation is provided by the five individual center cells, the vertical movement detected by the pilot is acutally caused by the

movement of the pilot's eye through the various portions of the glide slope provided by each cell.

The pilot must learn to anticipate meatball movement in making glide slope corrections. Anticipating the meatball will help you avoid overcorrecting or translating one error into another. To demonstrate how this can happen, consider the same Diego Garcia approach where the OLS is located 750 feet down the left side of runway 31 and 155 feet from the centerline. Only this time you intercept the glide slope with a high meatball indication at 1.5 miles. In an effort to correct down to the glide slope you reduce power and wait for the meatball to center. But at ¾ to ½ miles you suddenly notice the ball dropping rapidly towards the bottom. This rapid movement through the glide slope is referred to as a "supersonic sunset" and is the opposite of a "supersonic sunrise." Both are caused by the increasing sensitivity of the ball as your aircraft gets closer and the glide slope narrows. Therefore, as the meatball begins to move, the pilot must anticipate it reaching the desired glide slope and readjust power to stabilize the ball before it goes too far. The key is small, timely corrections because the time lag is especially prevalent for larger transport aircraft.

DISTANCE FROM LENS IN MILES	1	1/2	1/4	1/8	1/16
WIDTH OF CENTER CELL IN FEET	36	19	11	7	2

Figure 2: Glide slope presentation on fresnel lens OLS shrinks as aircraft closes distance to lens.

Finally, pilots of a very heavy aircraft such as the C-5 must exercise extreme caution in deciding how far down final to follow the ball before breaking off and initiating their flare. Unlike a fighter-type aircraft such as an A-7 or F-4 where the distance from the pilot's eye to his main gear is 10-15 feet, the corresponding distance in a C-5 in an approach attitude is approximately 50 feet. A 3¼° glide slope originating from a lens placed 750 feet from the approach end of the runway will place a tactical jet at approximately the 600 to 650-foot mark if flown to touchdown or 100-150 feet prior to the lens. However, the C-5 will contact the ground at about 875 feet from the lens or roughly 125 *before* reaching the runway if it is flown to touchdown with a centered ball. So be sure to break off the approach early enough to assure being 50 feet high when you cross the threshold.

The fresnel lens optical landing system provides a visual indication of your relative position with respect to a prescribed glide slope. It can be used by MAC aircrews as an additional approach aid at Diego Garcia. Do not, however, attempt to "fly the meatball" since a wrong interpretation can aggravate glide path deviations. And do not ignore a red meatball either because it means you are low on glide path. The fresnel lens landing system has the potential, if used properly, to help you safely deliver the goods to the garden spot of the Indian Ocean.

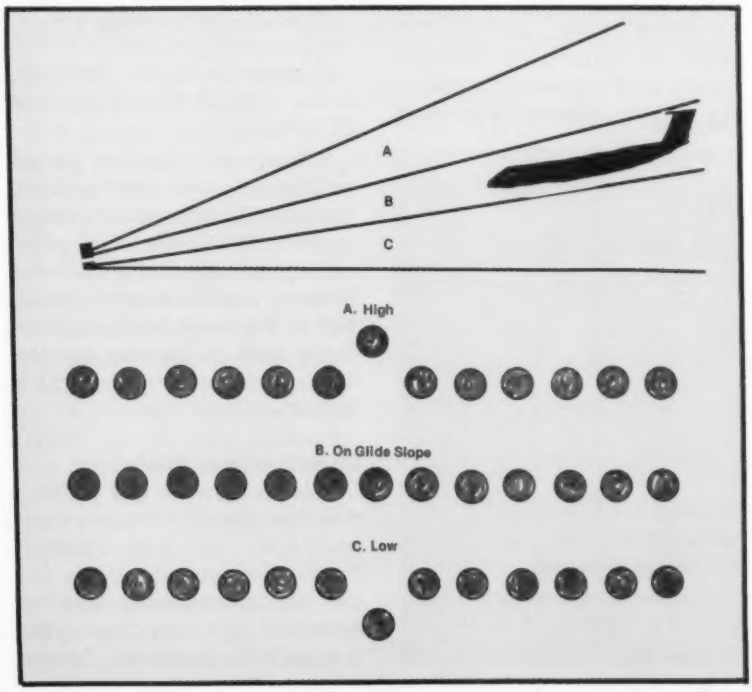


Figure 1. High, low, and "on-glide slope" presentations. At point B the pilot sees an "on glide slope" presentation. If he reaches point A the pilot will see an "above glide slope" presentation. At point C the pllot sees a "below glide slope" presentation.

1981 Mishap Statistics

A good year for MAC.

During 1981, MAC aircrews flew over 700,000 hours and experiences six DOD Class A flight mishaps. This gave us a Class A mishap rate of .83 accidents per 100,000 flying hours. The Class B rate was .56 per 100,000 hours. In both categories, MAC had one less mishap than the computer at AFISC pedicted we would. This compares favorably with some of our best years and only AFRES, with a Class A rate of.75, had a better record than MAC in 1981. Even with this relatively sterling flying safety performance, it is still sobering to review those mishaps we did experience, especially when we realize how many involved the human factor.

Class A Mishap Briefs

• A C-130 crashed and was destroyed shortly after takeoff from an overseas base. The cause of this tragic mishap could not be determined. Seven crewmembers and two passengers were killed and the dollar cost amounted to $2.6 million.

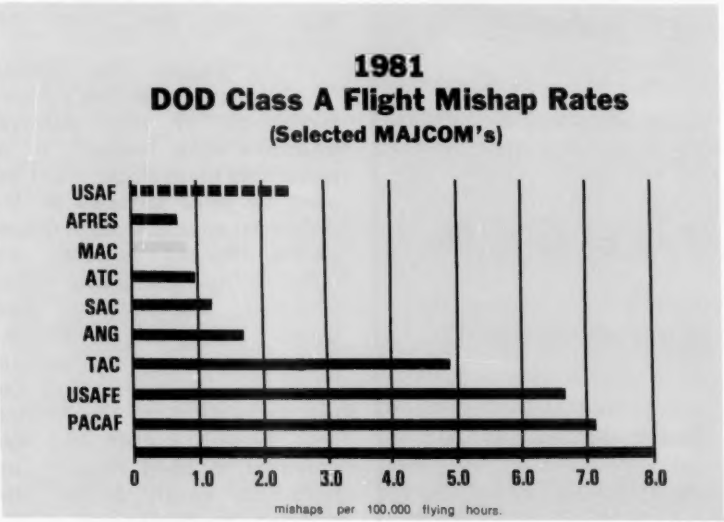
• A C-141B's left main landing gear strut separated while taking off from an overseas base. The superb professional actions by the entire crew resulted in the damage cost being limited to only $270,000. The mishap was caused by an improperly installed landing gear lock washer. There were no injuries.

• The next Class A mishap occurred when an HH-53B received extensive damage during an air refueling mission. The pilot, in attempting to avoid hitting the refueling drogue, overcontrolled the aircraft causing the rotor blades to strike the fuselage. The damage totalled $295,000. Fortunately, there were no injuries.

• A C-130H was destroyed when it landed short of the runway during a special operations low level (SOLL) training mission. Operator and supervisor error were involved. Seven passengers were killed. The mishap cost was pegged at $6.5 million.

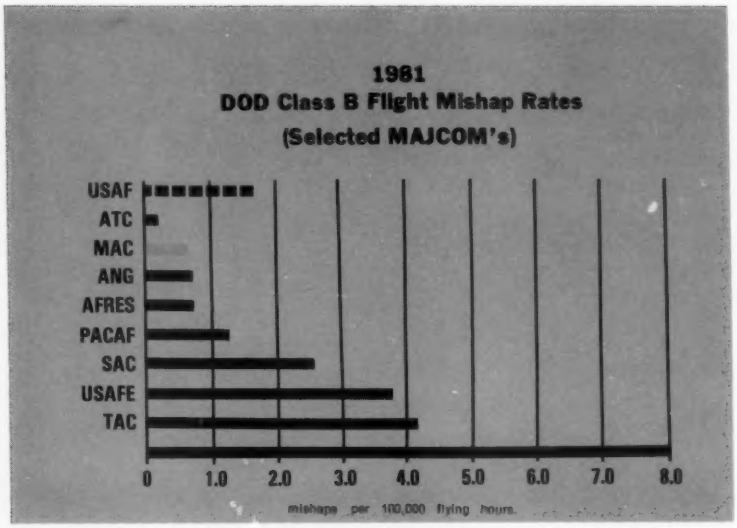
• Six people were killed during an HH-53B simulated combat training mission. The instructor pilot performed an evasive maneuver without ensuring adequate terrain clearance. Dollar cost of the mishap was $3.1 million.

• The final MAC Class A flight mishap occurred when a C-130 sustained extensive fire damage in the flight deck area while taxiing for takeoff. Faulty maintenance practices were identified as the cause of this mishap. There were no injuries, but the repair cost was set at $2.5 million.



Class B Mishap Briefs

• While on an H-3 training mission, the IP improperly demonstrated an autorotation. Power was applied too late and the helicopter landed with an excessive sink rate, causing the tail boom to break off. Cost of



the mishap was $119,000. There were no injuries.

• Structural damage occurred to a C-5A when its main landing gear failed to extend properly, necessitating an emergency landing with partial gear. Cost of this mishap was $107,000. The cause of the gear malfunction was material failure.

• A C-141B petal door failed during an airdrop training mission. Failure was due to undetected long-term corosion in the honeycomb structure of the petal door. Cost: $71,000.

• The final 1981 Class B mishap occurred when a C-130 made an emergency main-gear-up landing. The main gear could not be lowered because water trapped in the gear assembly froze and forced the spline shaft from the top of the ball screw. Repair cost amounted to $70,000.

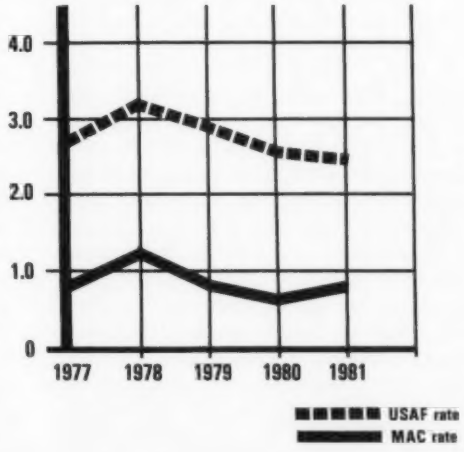
Air Reserve Forces

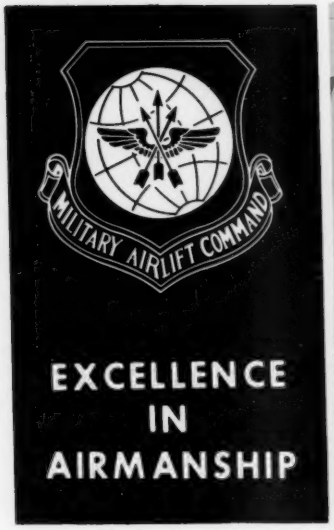
MAC-gained Air Reserve Forces experienced no Class A mishaps and only one Class B mishap during 1981. An AFRES C-130A suffered substantial damage when the crew failed to extend the landing gear before touch down during a series of practice approaches. Both operator factor and the aircraft's gear warning system were identified as cause factors in this mishap. There were no injuries, but the aircraft damage amounted to over $155,000.

A Very Good Year, Relatively Speaking

While not quite as good as 1980's record-low Class A mishap experience, our 1981 rate ranked right there among the lowest in the command's history. This enviable record represents substantial efforts on the part of both flight crews and support personnel and shows a real desire to keep MAC the safest and most professional command in the Air Force. Only by continued efforts, especially where the human factor is involved, can we hope to reduce these tragic and expensive losses to our nation's critically needed airlift capability.

Five-Year USAF & MAC Class A Flight Mishap Rates





Standing Left to Right: TSgt Thomas M. Jenkins, FE; Capt Frank Sanderson, Jr., N; Capt Kenneth H. Davis, CP; Capt Steven E. Riewerts, N; A1C Jeffery W. Hermann, LM; A1C Peter A. Miller, Crew Chief. Kneeling Left to Right: Major Joseph R. Brown, Jr., AC; Maj Roger P. Cantley, CP; SSgt Michael See, LM; TSgt Charles A. Moulton, FE; MSgt Donald Williamson, LM.

Major Brown and crew. During a night heavyweight takeoff from Lajes Field, this 75th MAS crew experienced a very rude shock right after their C-5A accelerated passed "go speed." Just as Major Brown raised the nose for liftoff, he and his crew heard a loud "bang" accompanied by a bright flash of light from the left side of the aircraft. A quick scan of the engine instruments revealed the number 2 engine's N_1 and N_2 were rolling back, the TIT had gone off-scale hot and the fuel-flow was off-scale high. Maintaining aircraft control, Major Brown continued the takeoff, informed the crew of the situation and climbed straight ahead to pattern altitude. The primary concern of the crew now was to keep the 712,500-pound Galaxy climbing. To accomplish this, Major Brown ordered the gear up and the flaps left at 40 percent. To further complicate matters at this time, the tower informed the crew of the crippled C-5 that flames were coming from the number-2 engine. Confirmed by the troop compartment loadmaster, Major Brown ordered the engine shut down. Major Cantley, the copilot, pulled the number 2-fire handle and discharged the agent. Passing 800 feet AGL, the ailerons were streamlined and the rudder set at MIN Q.

With the number one priority of getting the disabled Galaxy back on the ground as soon as possible, the crew worked together to ensure a safe landing. Captain Davis, the jump seat pilot, cleared the aircraft in the turns, monitored engine instruments and helped keep the runway in sight. TSgts Jenkins and Moulton, the flight engineers, maintained a scrupulous watch on the engine instruments, monitored the giant aircraft's overall performance and computed the necessary landing data. Captains Riewerts and Sanderson, the navigators, insured terrain clearance which was critical due to the aircraft's reduced performance and its close proximity to the island's high terrain. The loadmasters and the crew chiefs were also busy securing the cargo compartment, troop compartment and briefing the passengers. In all, this total crew effort resulted in a successful three-engine approach and landing. Major Brown and his crew's superior airmanship, procedural knowledge and exceptional crew coordination were directly responsible for the safe recovery of a C-5 and all personnel during this extremely hazardous emergency.

Lieutenant Colonel Binford and Major Cox, 1st MAS. While starting their last approach to Lancaster, Pennsylvania during a local training mission, the gear on their VC-140 failed to lower even though the gear doors were down. Lt Col Binford, the IP, requested an immediate clearance to Andrews AFB and then initiated emergency

Left to Right: Major Allen V. Cox, CP; Lt Col Eugene E. Binford, IP.

procedures to lower the gear. After following Dash One procedures for manually lowering the gear, the crew completed an uneventful approach and landing. Uneventful, that is, until the throttles were placed into reverse. At 80 knots the thrust reversers were moved to idle reverse and the aircraft began an abrupt pull to the *right*. Closing the reversers at 60 knots produced an abrupt pull to the *left*. Evidently, closing the reverser doors permitted the number 3 engine to produce 93 percent *forward thrust*. Major Cox again reversed all engines to regain control of the Jetstar and the crew immediately tried to shut down the errant number 3 engine. Moving the throttle to cutoff, however, had no effect. Lt Col Binford quickly pulled the number 3 engine fire handle, finally shutting the engine off. The quick, accurate and professional actions of this crew prevented possible injury to themselves and damage to a valuable Air Force aircraft.

Captain Childers, 1550th Technical Training Squadron. An instructor in the TH-1F, Captain Childers was instructing a student in manual fuel

Captain Stephen P. Childers, IP.

procedures during a training mission. The aircraft responded normally up to the point where the throttle was rolled to flight idle. Once the fuel light illuminated indicating the fuel control was in manual, the N_g (gas producer speed) rose to 87 percent and stabilized. A moment later, as the student was preparing to roll the throttle to flight idle, the engine started an uncommanded and uncontrolled rapid acceleration. Immediately assuming control of the Huey, Captain Childers started increasing collective pitch to maintain N_R (rotor speed) within limits while attempting to reduce the accelerating N_g by fully decreasing the manual fuel switch. Despite his efforts, the engine and rotor speeds continued to increase. As the N_f (power turbine speed) and N_R reached 7,100 and 350 rpm respectively, Captain Childers realized the only way he could avert a possible mishap was to shut down the engine and execute an autorotation. Rolling the throttle to shutoff and reducing the collective to enter autorotation, Captain Childers turned the aircraft 180 degrees into the wind and completed a textbook, power-off autorotation. After sliding about 50 feet to a stop, the crew safely egressed the aircraft. Captain Childers' quick, competent and professional actions in the face of this serious inflight emergency averted a potentially disastrous mishap.

Mishap with a Moral

Cause Undetermined

Thunderstorms and "Gooney Birds" do not mix.

festive mood pervaded the group of 30 passengers as they boarded the commuter airline's venerable DC-3. It was a balmy evening at West Palm Beach airport and the low pressure area drifting over Southern Florida was evidenced by high broken cloud layers and scattered buildups. The group was made up of friends and company employees who were looking forward to a few days in the Bahamas. The complimentary round trip to Freeport Airport on Grand Bahama Island was being offered as partial compensation for services rendered to the small air carrier.

Because of other commitments, the director of flight operations, who was scheduled to fly the aircraft, called in another pilot to take the flight. The replacement pilot reported in during the afternoon and performed engine and radio checks on the DC-3. At about 1800 hours, the first officer called Miami Flight Service Station (FSS) and requested weather and terminal forecast for an IFR flight plan to Freeport with a 1900 departure time. The briefing included current notams, Freeport weather and a SIGMET which indicated active thunderstorms in the area of the proposed route of flight. About 30 minutes later the first officer again phoned the FSS to file an IFR flight plan for the short hop from Palm Beach to Freeport with an enroute time of 35 minutes. The caller was given the Freeport special weather report and an update on thunderstorm and precipitation along the proposed route of flight. Included was the current Freeport weather of 8 miles visibility with a "thunderstorm right over Freeport now."

An hour later the 2 flight attendants had all 30 passengers seated in the cabin and the first officer called tower to put their clearance on request. Cleared as filed, the DC-3's big Pratt & Whitney radial engines rumbled to life and were soon accelerating the aircraft down the runway for takeoff. Shortly after full throttle was applied, though, the crew rejected the takeoff and reported they had no airspeed indication. They taxied back to parking but requested their flight plan be held open. The director of maintenance met the aircraft and after the passengers were deplaned, noticed "something sort of grayish in color" on the captain's pitot tube. Since the pitot tubes were about 10 feet above ground level, he used a ladder to reach them. The captain's pitot tube ram-air opening was completely covered with a mud dauber's nest and another nest partially covered the first officer's pitot tube. The aircraft had not been flown for about 5 weeks and had been left outdoors *without* pitot covers installed. In fact, there were no pitot tube covers available for the airline's DC-3's, and their normal procedures checklist did not contain requirements for checks of the pitot tubes or static ports on the aircraft. After the pitot tubes were cleaned out, using a coat hangar and a small screwdriver, the captain performed a high-speed taxi check. He reported "everything was perfectly normal," so the passengers were reboarded and the plane again taxied out for takeoff.

The second takeoff attempt was successful. Departure control then acknowledged radar contact and cleared the DC-3 to climb to 5,000 feet, the cruise altitude, and to proceed on course. A few

miles further east, the commuter was handed off to Miami center, who advised them of weather at their 11 o'clock position at 5 miles. The flight crew acknowledged and a few minutes later reported reaching 5,000 feet. Miami then cleared the flight for the approach to Freeport and directed them to cross Halbi intersection at 4,000 feet. The Freeport altimeter was given as 29.99 inches. The clearance and altitude restriction were acknowledged by the first officer; the local altimeter setting was not. Moments later Miami center advised that the DC-3 was now beyond the range of Miami radar and contact had been lost 45 miles east of West Palm Beach. The flight was then asked to contact Freeport approach control. After establishing contact with approach the flight was cleared to Freeport VOR and told to descend

It happened quickly and without warning

and maintain 3,000 feet. The crew was also provided with the current weather observation which included light rain showers, winds of 180° at 12 knots, gusting to 26 and cumulonimbus buildups in all quadrants.

Freeport asked the DC-3 to confirm it was at Halbi intersection and to report leaving 4,000 feet. The first officer confirmed their position as Halbi but did not report descending out of 4,000. After approach control requested their altitude, the first officer replied they were descending through 3,700 feet. Approach acknowledged this transmission, cleared them to descend to 1,400 Freeport, and to also report leaving 3,000 feet. The first officer acknowledged the clearance and reported descending out of 3,000 feet. Two minutes later, Freeport approach again requested the commuter's altitude; there was no response.

Freeport then declared an emergency and called the U.S. Coast Guard to search for the aircraft. A Coast Guard C-131 from Miami arrived at the last reported position of the DC-3 and aided in part by the lightning which illuminated the area, was able to see bodies and debris floating in the water just 3.5 miles west of Grand Bahama Island. The bodies of 16 passengers were recovered. After an extensive but futile search, the rest of the passengers and crew were presumed dead. The aircraft went down in 1,800 feet of water, making recovery impossible.

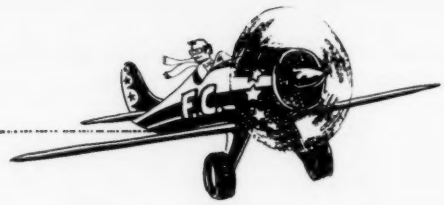
Because of the lack of eyewitnesses and other physical evidence in the form of wreckage, NTSB officials were unable to make a clear-cut determination of the cause of this tragic accident. However, heading their list of factors which most likely contributed to the fate of the DC-3 and all aboard was "flight into known thunderstorm activity." And of course, the DC-3 had no thunderstorm detection equipment nor was it required to have such equipment installed. We'll never know whether or not it was lightning that struck the aircraft and possibly caused the crew to lose cockpit instruments or lighting. This could have induced spatial disorientation resulting in loss of control. The pitot/static problem the crew experienced is another possibility. The method used to clear the obstruction was certainly not proper maintenance procedure. The pitot tubes should have been disconnected downline and blown out to insure they were free of obstructions. But with the loss of airspeed indications, engine power settings and attitude reference instruments could have been used to maintain a flyable airspeed. Even so, loss of airspeed in combination with other factors, such as turbulence or spatial disorientation, could have had a significant effect on the flight crew's ability to cope with the conditions they encountered.

Investigators summed up their analysis of the accident by concluding that "the manner in which the flight was planned (into known thunderstorm activity at night with no CB detection equipment) and the maintenance performed on the aircraft were totally inconsistent with a level of safety which should be expected from a passenger-carrying operation."

Whatever befell the flight, it happened quickly and without warning sometime during the 2 minutes between 2058, when they reported descending out of 3,000 feet, and 2100, when approach lost radio contact. One last hypothetical "what if" is offered as another possible, albeit speculative explanation of this grim mystery. Freeport, airport weather observers reported sighting a funnel cloud at 1330 that afternoon, and a waterspout was sighted about 30 minutes prior to the DC-3's last transmission. But we'll never know for sure because as investigators noted, the probable cause of the accident could not be determined from the available evidence.

—Adapted from NTSB-AAR-81-5

Flying Circus



In this episode of "Flying Circus," we are happy to announce that we have again come face-to-face with the enemy and have found he is, indeed, us. *After all, you don't live long enough to make all the mistakes yourself. A couple of the following flying safety incidents rate a chuckle or two. Some are too close to call.* —Ed.

Laid-back Lingo

Everyone knows that air traffic controllers are taught to do and say everything by the book at the FAA Academy. Radio technique is an especially picky course. Controllers are taught to be brief, precise and, above all, speak only the language taught in the "Good Book" (i.e., the FAA handbook on precise use of accepted English applied to aeronautical operations). No classroom exercise could bring

home the message of precise language as well as what an air traffic controller witnessed while riding along on a familiarization ride with a major airline.

"I was riding in the jumpseat on a commercial DC-10. My hosts had recounted some horror stories of ATC's 'system errors,' and I had been obliged to counter with a protracted tribute to the devotion and sterling performance of the FAA's ground troops. We were still a long way out and the guy who answered our callup was one of those "super 'trollers" I had been bragging about. The Los Angeles skies were dark with exhaust trails, the radio jammed with calls; but the 'man in the cab' had the big picture. My uneasiness at being mixed up in the rush-hour melee calmed under his nonstop monologue of combined ATC "CB-ese" and Buck Rogers jargon—not exactly standard phraseology, but it kept everyone moving.

"We touched down on runway 25L and made a fast right turn for the terminal on the other side of the parallel runway. Local control held on to us.

"Keep 'em spooled up, flight 102, you'll be across in a minute," assured the voice in the tower.

"What did he mean? Were we cleared to cross? The captain shrugged and pushed the throttles up. As we nosed onto the runway, the first officer swung around for a look."

"STOP!"

"Someone stood on the brakes, throwing me against the harness, as a blue and white blur filled the windshield. A wingtip flashed by scarcely out of reach of our noses, as the departing jet rotated and disappeared. *We had come within yards of hitting a 727 on takeoff roll.* Joe Cool and his snappy lingo nearly got us creamed."

In the wake of the recent air traffic controller's strike, the need for increased vigilence is upon us as professionals. We all have a "good idea" of what the proper phraseology would have been: "Hold short of runway 25 right," or something similar. "CB-ese," "good ole boy," and Buck Rogers lingo have their place. That place, however, is not in the cockpit or in the tower.

Dietary Notes

Occasionally, in our attempt to find a softer ride, we overlook those unpretentious one-liners that come over the "phones." Reference this zinger of a dialogue between two civilian types and ATC—somewhere.

Center—"How's your ride at FL350, flight 123?"

Flight 123—"Well, we're eating dinner and the Captain's stabbed himself with his fork three times."

(The silence is deafening!)

Center—"Flight 456, how's your ride at 290?"

Flight 456—"Don't know. Haven't eaten yet."

The Traffic Report

It was rush hour in Seattle with radio and TV stations broadcasting their traffic reports for their listeners. An airborne announcer for one local radio station was reporting traffic conditions from a single engine aircraft. Meanwhile, a television reporter and cameraman were aboard a light helicopter, also doing a traffic report from their bird's eye view over the city. The light plane and the helicopter collided at about 1,000 feet while the occupants of both were concentrating on reporting traffic near a busy ferry terminal. Miraculously, both pilots were able to make emergency landings on nearby golf courses and there were no serious injuries. NTSB officials ruled that both pilots had failed to "see and avoid" while operating in visual conditions. Their concentration on what was happening on the ground came within a hairs-breadth of becoming a fatal diversion.

The Walk Around

When the second officer went out for his early morning preflight he found the cockpit chock-full of mechanics. Not wanting to interfere, he proceeded with his external walk-around inspection. When he got to the nose landing gear, he was surprised to find the pin still installed. Being a conscientious type, he removed it. Imagine his surprise when the aircraft slowly settled on its nose as the nose gear retracted. The explanation? Those mechanics in the cockpit were checking the squat switch on the nose gear which required the handle to be up and the hydraulic system pressurized. What a way to start the morning!

FOD For Thought

"Evidently I didn't taste good," remarked George Kuper, mechanic for Alaska Airlines after being sucked head-first into a Boeing 737's howling engine during a maintenance ground run. He survived the incident by hanging on until the engines stalled, backfired, and spit him out.

The incident lasted only 2 minutes but seemed an eternity. While Mr. Kuper was working on the fuel control, he apparently got too close to the engine intake. By bracing himself on the engine inlet guide vanes (forward supports) he was able to avoid the whirling compressor blades—by *inches*.

Mr. Kuper suffered lacerations on his forehead and hands and deep cuts on his knee, but no broken bones. Aircraft damage was $250,000 due to screwdrivers and pliers that were also sucked into the omnivorous turbines. MAC maintenance wrench-benders should take notice of this incident and not let themselves become FOD for thought.

Midair Highway Collision

Nevada is pretty open country and, except for the really tightly controlled and populated areas, one can fly with relative ease around the countryside—within FAA rules and regulations, of course. One wayward soul didn't and ended up forfeiting his license. But that was really his own fault. The story starts when an unidentified pilot called the North Las Vegas airport. He reported his small plane had been involved in a midair collision with "something" just outside the town. Visions of "UFO's" and the like popped into the local gendarme's mind and with local FAA investigators in tow, he proceeded to the "scene of the crime." It didn't take long to surmise the cause of the "midair." A stationary road sign, approximately 7 feet tall had been neatly taken down with one swipe of a small plane—the one in question. The pilot's license was revoked pending appeal and he was summarily charged with wreckless flying at low altitude. Describing the violation probably presented investigators with some problems: Let's see, was that really a midair? How about a semi-ground?

TMF Interview

A space shuttle crewmember, Colonel Karol J. Bobko, USAF, describes . . .

Flying the Shuttle

TMF: How important is flying safety in space operations? Or to shuttle operations specifically?

Col Bobko: I learned a long time ago that if you wish to become an "old aviator" you better use as much flying safety as possible. This philosophy holds true for "flight" operations in space as well. And because the shuttle recovers and lands much like an airplane, aircraft safety factors also apply to the shuttle.

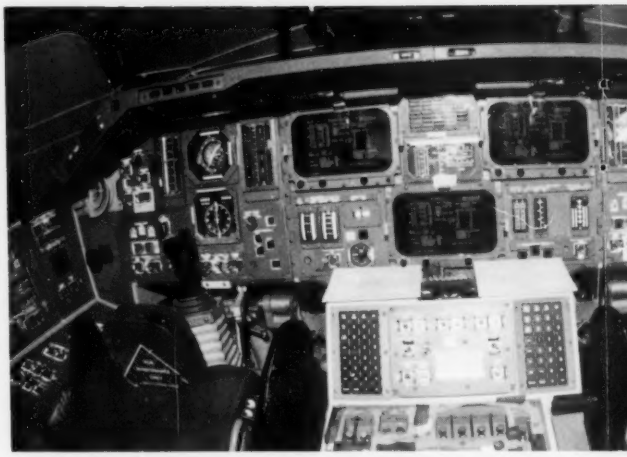
TMF: What is the potential for human factors mishaps in shuttle operations?

Col Bobko: During ascent and entry, the computers can pretty much fly the shuttle automatically. But if a failure occurs, the crew must often reconfigure systems or manually control an operation. In the confusion of a failure, you always have the possibility of someone making a mistake and doing something wrong. I think human factors can definitely enter into that kind of situation and most problems can be prevented by keeping the required actions simple and straightforward. On orbit (meaning while in earth orbit), because there will be different missions, operations will not be as "canned." The various missions will not call for operations to be done repetitively and the computers won't do them automatically. The result is the astronauts will perform many and varied tasks on orbit and so human factors enter into these operations.

TMF: Could you describe the types of warning and caution systems you would monitor during flight?

Col Bobko: Our caution and warning system monitors a large number of parameters. On the cockpit's front panel we have a 42-light matrix. A light on this matrix will illuminate if a limit is exceeded. In the aft section of the cockpit there is a panel which allows manual adjustment of the 120 channels that drive the 42 forward lights. In some instances more than one channel may drive only one light. For instance there is a separate channel for each APU temperature but only one light.

Additionally, the computer system monitors many parameters. On the bottom of each cathode ray tube (CRT) display, located in front of the pilots, there is a message line where an out-of-limit parameter can be noted. Both the primary and backup computers perform this function. When a message is presented, a light comes on and a tone sounds directing the crew's attention to the message.



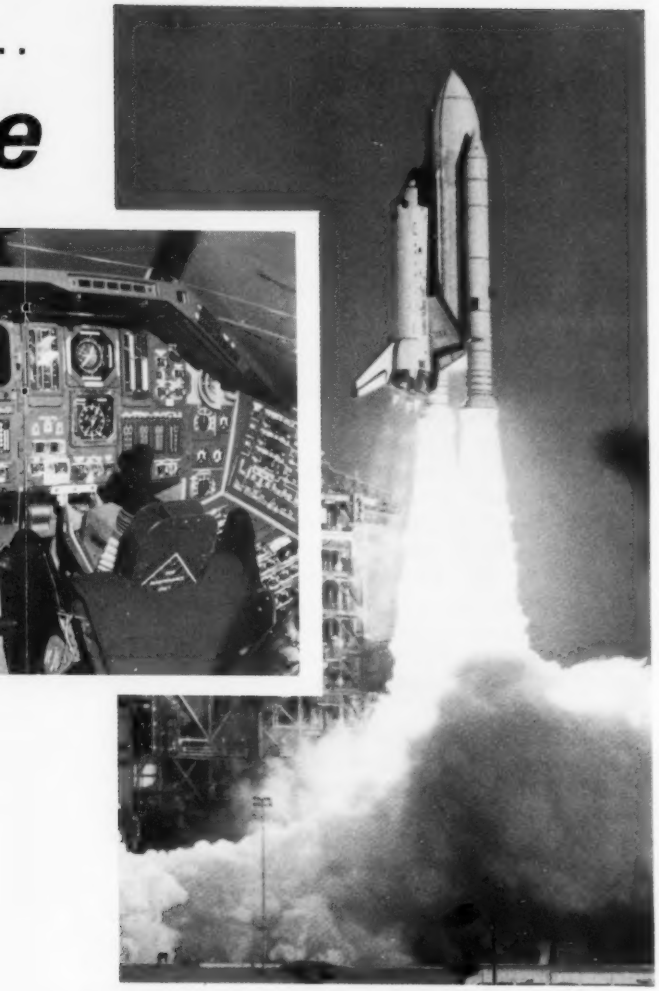
View of the flight deck of space shuttle orbiter 102 Columbia.

TMF: Can you summarize what instruments the astronauts monitor during the launch and ascent phase of a shuttle flight?

Col Bobko: First, there are a number of instruments that are dedicated to subsystem operations. For instance, some instruments monitor and control the auxiliary power units (APU's). Unlike conventional APU's the shuttle APU's supply necessary hydraulic power and not just auxiliary hydraulic or electrical power. This hydraulic power is required for engine gimballing and vehicle control. Additionally, immediately after lift-off the astronauts monitor the main propulsion system. After approximately 8 minutes, when the main engines have shut down and the external tank is jettisoned, the shuttle crew will watch the operation of the orbital maneuvering system (OMS) engines. These OMS engines provide the last kick required to get the shuttle into orbit. The external tank falls back into the ocean, as would the shuttle if it were not for the OMS engines.

To monitor the trajectory the shuttle crew has a set of instruments very similar to flight instruments used in conventional aircraft. Of course, shuttle instruments have a wider range

All photos courtesy NASA.



since shuttle speed goes to orbital velocity and the altitude goes to hundreds of miles. The shuttle instruments also include an attitude indicator (8-ball). This display is a three-axis indicator for space flight (roll, pitch, and yaw) and serves as a two-axis indicator (roll and pitch) for aerodynamic flight. CRT displays are also used to give a visual presentation of the trajectory. The CRT display provides a vertical cut through the trajectory and tells you how you're doing with respect to attitude and velocity during ascent.

TMF: When would you attempt a "return to launch site" (RTLS) maneuver?

Col Bobko: You would have to make an RTLS if you lost an engine or had some other major problem occur soon after the beginning of the ascent. Another major problem, for example, might be a large cabin leak.

TMF: What instruments on board would you be monitoring to make sure you're on track or proceeding according to plan while in orbit?

Col Bobko: Most of that is done using the CRT displays and the "8-ball." The dedicated displays, the tape altimeter and Mach velocity, are not driven while the shuttle is on orbit.

TMF: What are your five general purpose computers used for in flight?

Col Bobko: For everything! The vehicle is unstable in many phases of flight and so the computers are necessary to keep control. Four of the computers are acting together; i.e., each of the four are doing exactly the same thing while the fifth computer is a back up.

TMF: Are there different modes available for the flight control system?

Col Bobko: Yes. On orbit, for example, there are various modes of rotation control available to the crew. The most easily understood is "ACCEL" which stands for acceleration command. In this mode when the astronaut moves the control stick out of center the computer will fire the small rocket engines that rotate the vehicle. The engines will remain on until the stick is returned to center. Another mode is "PULSE." The PULSE mode is similar to ACCEL except when the control stick is moved from center the engines fire just one preselected pulse. A third possible selection is "DISC RATE" which stands for discrete rate. In this mode when the astronaut moves the control stick,the computer fires the rocket engines until the shuttle is rotating at a preselected rotation rate and maintains that rate while the stick is out of the center. There are also automatic modes which will maneuver the shuttle to attitudes input into the computers by the crew.

TMF: How's the cockpit workload for the two people up front.

Col Bobko: If everything is going fine, the cockpit workload is not overwhelming. The workload problems occur, as in just about all flying operations, when things start to fail.

TMF: How would you adjust your Mach number after the deorbit burn; let's say at 115,000 feet, to get back on programmed trajectory?

Col Bobko: Most of the adjustment's are done automatically and usually you are in a monitoring position. But if you are flying the shuttle manually, which you can in this flight phase, you are primarily interested in controlling drag. As you increase drag you slow down more quickly and decrease your range. As you decrease your drag you go farther. However, it should be noted that you cannot open speedbrakes or even change the angle of attack to increase drag. The angle of attack is set because of heating considerations and the speedbrakes position is dictated by

heating or stability. Drag is increased by getting deeper into the atmosphere. You do that by rolling the shuttle into a steeper bank. Once the shuttle is in a steep bank the lift vector is off to the side and the shuttle will subsequently fall faster into the atmosphere. This maneuver allows the drag to increase which in turn decreases your range.

TMF: Could you describe the reentry phase?

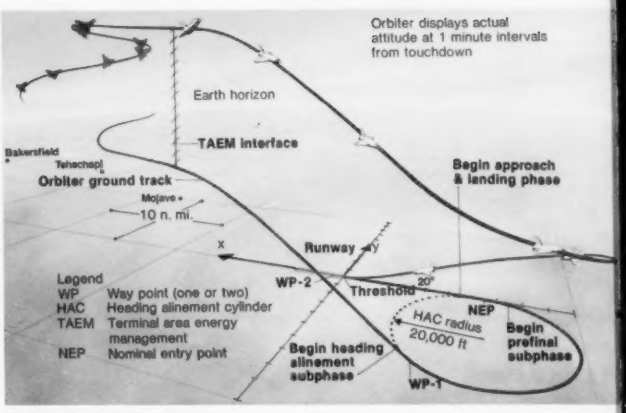
Col Bobko: It might be suggested that there are actually a number of phases which occur during entry. The procedures which I just described are in the upper entry when you are flying at a very high and constant angle of attack (around 40 degrees). In that flight phase, you increase or decrease your drag by rolling the vehicle over so it falls into thicker atmosphere faster. What may be regarded as the later phase of the entry is called terminal area energy mach (TAEM) and starts about Mach 2.5. Once the shuttle enters that phase of flight, it is flying more like an airplane. If you are "hot" you just put the nose down and dive off energy by the increase in drag experienced at a higher airspeed. If there is too much energy to simply "dive-off" energy you may have to make a turn away from the target to lengthen your ground track. We call it an S-turn. All these maneuvers and techniques are designed to get you to the vicinity of the runway with the right amount of energy.

TMF: From the deorbit burn to the landing, what instruments would the pilot be monitoring?

Col Bobko: Again, pretty much the same combination of instruments as monitored during ascent. The pilots will use some dedicated displays that indicate altitude and equivalent airspeed, as well as Mach and velocity. Unlike normal aircraft, shuttle displays have ranges which are significantly expanded. The crew does use an HSI, but unlike normal aircraft, the shuttle HSI is not displaying direct information from the tacan . Instead it provides navigation information that may include ranges of thousands of miles. The "8-ball" is operational and we use the CRT's for both trajectory and subsystem operation. As during ascent we also monitor dedicated systems meters.

TMF: What are your options after you've begun reentry?

Col Bobko: Once you've fired your rocket engine to come back to earth and land at a particular landing site, you are committed to an entry. With the shuttle you don't have the capability to get back into orbit by refiring your rocket engines. If you discover during entry that you don't like the weather, you can't go to an alternate or even make more than one pass. If you have an equipment failure you must continue. Because of this limitation, we train intenseively on all kinds of



STS-1 Entry Flight Profile.

"what if" failure situations and learn to use all the redundancy and alternate systems built into the shuttle. Since the shuttle does have a lot of capability, three tacan to cite just one example, you can deal effectively with even very serious problems.

TMF: What general weather criteria do you use for your primary and alternate landing sites?

Col Bobko: At present, we have pretty high weather standards. The criterion for the first shuttle flight was good weather no more than scattered clouds. For now, NASA likes to have cloud cover of no greater than 5/10ths and visibility of at least 7 miles. However, those standards will change as we have more flights because the shuttle is designed to eventually have automatic landing capability. As with any aircraft, our experience will allow us to lower our landing minimums and therefore provide significantly more flexibility.

TMF: How many waypoints do you program into the shuttle's inertial navigation system?

Col Bobko: Three targets can be loaded into the computers for an entry and landing. These will be the ends of the landing runways at any of the possible landing sites. If, for example, the landing site were Edwards AFB the computers would be loaded with two runways at Edwards and one at White Sands, N.M. The Northrup strip runway is loaded in case of an underburn during the deorbit burn. This information, and much more information, is stored on the mass memory units and is loaded into the computers by the crew in preparation for a deorbit and landing.

TMF: Can you describe the microwave landing system (MLS) indications you get in the cockpit that give you course guidance compared to a conventional ILS?

Col Bobko: The MLS gives you elevation,

azimuth, and range. It will pin your place in space exactly, and we normally pick up the MLS at 16,000 feet. There are a group of computers that maintain a constant knowledge of your position in relation to the runway. MLS data is fed into these computers which subsequently updates their knowledge of your present location. The computers then generate indications which put you on the desired flight path. Because the MLS is constantly providing the computers with information about where the shuttle is located with respect to the runway, it's quite possible that you could change your flight path and still use the same MLS.

It is even possible to fly a curved flight path; and the shuttle does this in a vertical plane. At the present time only Edwards AFB, Northrup Strip at White Sands, and the Kennedy Space Center runways are equipped with MLS for shuttle operations.

TMF: Has NASA cleared the area of all the air traffic out of your proposed landing sites except chase planes?

Col Bobko: The NASA mission control center has to coordinate with air traffic control to insure there are no aircraft in the shuttle landing area except those directly involved with the mission. Obviously the shuttle has no capability to hold for other air traffic once its reentry is initiated, so the areas must be clear.

TMF: Could you compare and contrast shuttle instrument flight to conventional aircraft based on your previous Air Force flying experience?

Col Bobko: The shuttle system is more integrated than avionics in the aircraft I've previously flown. As an example, in a more conventional aircraft the flight control system is able to function without an IMU. In the shuttle, however, the flight control system needs accurate information from the navigation system to function properly. During an entry the shuttle must fly the correct trajectory to meet all the heating and flight control constraints and therefore the guidance, navigation and control systems are tightly intertwined and must work together correctly. Surprisingly, many of the same skills you use in normal instrument flying apply. The interpretation of instruments and staying ahead of the vehicle are as applicable to flying the shuttle as flying any Air Force aircraft.

TMF: What types of missions will the shuttle be used for in the next few years?

Col Bobko: There are three shuttle missions planned for 1982. STS-3 will carry the remote manipulator system (RMS) and the OSTA-1 (Office of Space and Terrestrial Applications) experiments payload and STS-4 will include a DOD payload. STS-5 will carry to orbit two satellites and the "kick" stages required to boost those satellites to an orbital altitude of 22,000 miles. 1983 should see us fly Challenger, the second operational vehicle and the launch rate should increase to about 6 launches that year. These next few years should see the shuttle flying frequently in space.

TMF: Can you summarize what we've learned so far from shuttle flight?

Col Bobko: The realization that the shuttle is a highly sophisticated, complex, and capable vehicle which works basically the way we predicted—I think this is the most important lesson we have learned from STS-1 and STS-2. We now look forward to expanding our knowledge about its capabilities and limitations so we can put the space shuttle to the most productive use possible.

TMF: Thank you for *The MAC Flyer.*

Interview conducted by Captain Gale E. Clouse, Jr.
Associate Editor

ABOUT COLONEL BOBKO:

A native of New York City, Colonel Karol J. Bobko was a member of the first graduating class of the Air Force Academy. He holds a bachelor of science degree from the Academy as well as a master's degree in aerospace engineering from the University of Southern California.

Colonel Bobko became a NASA astronaut in September 1969. He was a member of the astronaut support crew for the Apollo-Soyuz test project. He is currently assigned to the orbital flight test missions group at the Johnson Space Center and is in training for a future shuttle mission.

Cleared To Climb

An aircrew member gets his final clearance in this fictional tale.

by Major James E. Mrazek, Jr.
HQ MAC / Plans

Chuck Hollings didn't bother standing as the wing commander walked into the small hospital room. Colonel Gannet was a no-nonsense type who didn't stand on ceremony, especially under these circumstances.

"What does the doc say?" Colonel Gannett's low monotone quietly penetrated the medicinal atmosphere.

Chuck stared intently at Dave who lay immobilized on the hospital bed with bandages covering the left side of his face, his chest, and both his arms.

Honorable Mention, 1981 MAC Flying Safety Writing Contest.

— Unrestricted

"The doctor doesn't know what's keeping him alive. They can't stop the internal bleeding," Chuck replied, sighing softly. "They say it's only a matter of time. What the doc can't understand is why his fists are so tightly clenched, though. He's on enough pain killer, but he just seems to be gripping something, and he won't let go—maybe he's holding on to the little bit of life he has left," he surmised, speaking in a tone that sounded strangely detached and laden with fatigue.

Colonel Gannett,too looked at Dave's face. It showed an expression he could not fathom. Another crew lost, all dead except for Dave, he thought to himself. Another C-141 totally destroyed. Altus wouldn't even get the instrument panels for their static trainers out of this one, he thought grimly. His intuition told him the safety investigation would end up chalking this one up to pilot error. The real truth would either survive or be lost forever with the prostrate figure on the bed before him. Racking his memory, Gannett finally remembered flying a local training mission with Dave earlier in the year. A solid pilot, Dave's record was a good one, and enabled him to progress normally through AC upgrade. Liked by his squadron commander, Dave was respected by his crews. A normal, well-qualified AC like the hundreds in the system, Gannett mused, and yet he's laying here. Dear God, I wish I only knew why.

Dave looked over at his copilot and noted the apprehension in his face. A category II approach in night IMC was going to be a sporting proposition for this new right-seater who had never seen a "real" category II IFR approach. Well, thought Dave, I'm glad I've seen a couple. It's one thing practicing at Travis on locals when it's usually VMC, but it's a different ball game when it's night time in bad weather.

More power, thought Dave, as he pushed the throttles with all his might.

"Cleared for descent to flight level 290," came the controller's voice through the VHF radio.

What, thought Dave, I haven't even done the descent checklist yet. At least I briefed the category II procedures earlier and the special instructions on going around. I stressed to the young copilot that once he called "go-around" we were committed to do just that, even if he saw the runway as we started our missed approach. That was a mistake I made once as a copilot, Dave laughed to himself, and did the AC ever burn me on that one, and with good reason.

"Engineer, how's our fuel?" Dave asked.

"Standby one," replied the engineer as Dave directed the copilot to start the descent checklist.

As the engineer reported his remaining fuel in between checklist responses, Dave did some quick figuring. One approach at Travis would allow plenty of fuel to recover at Norton. But that's mistake number two, thought Dave. I didn't go over the routing to Norton. If we have to go-around, the copilot is going to be behind the power curve, especially when center asks our intentions. I can't let myself get hooked by these little mistakes, he thought. If there are too many more I'm going straight to Norton. I'm wise enough now to know those little things can add up to big trouble.

Rolling out on final with the checks completed, Dave concentrated on the ILS approach. He took a moment to glance at the right-seater and rechecked the configuration. Except for one item on the category II checklist, the CP was performing well.

"We show you high on glide slope," the backup GCA approach controller said. The copilot acknowledged.

Not good, Dave thought, I can do better than this. That's better, now I'm on glide slope, but the airspeed is high.

"A hundred above," announced the copilot. Then seconds later, the right-seater

suddenly blurted, "Go-around."

Dave called for go-around EPR. It was set, and he thought he saw the approach lights out of his left window. The copilot must have gotten overanxious and may have called that one a little early he thought.

"Engineer, what's our fuel?" Dave asked as the flaps were coming up.

With a little quick figuring again, Dave looked at the right-seater. "Tell approach we want another category II," he ordered.

"Pilot, this is the engineer. I figure we're fat on fuel too."

"Yeah," Dave laughed, "we'll give the copilot another chance to practice an IFR go-around."

The doctor stood nearby sadly shaking his head.

The copilot grinned sheepishly and went back to his duties.

On final approach again, Dave silently reflected on the first ILS. I'm going to do better on this one. All checks are completed, and I rechecked the configuration.

"We're 100 feet above," said the copilot slowly.

I'm wired right on, Dave thought. There won't be a go-around this time. No problems except for airspeed being a couple of knots high again.

"Go around," the CP said, this time with a clear sense of hesitation.

Dave's adrenaline surged as he pushed the throttles forward and called for go-around EPR. He could hear the engines surging.

"No, I have the runway in sight," yelled the copilot.

And so do I, thought Dave, glancing through his left window, then looking ahead and seeing the centerline lighting.

Dave jerked the throttles back, banked left, pushed forward on the yoke, and the runway appeared. I might as well try to salvage this screwed-up approach with a decent touchdown, he thought, as he eased the aircraft toward the runway. The touchdown was firm, but good. Dave picked the throttles up toward the reverse detent and opened his mouth to call for spoilers.

"The runway," gasped the right-seater.

Landing long, way too long, was the only thought Dave could comprehend for a good 3 seconds. The next was power. He jammed the throttles forward and prayed. The engineer yelled something. Dave's fingers squeezed the control column and the throttles. Come on baby, don't fail me now. As the end of the runway came up, he pulled back on the yoke. The first thump was almost gentle. It was the tail contacting the ground. Then the nose pitched down perceptibly, almost in slow motion. More power, thought Dave, as he pushed the throttles with all his might.

"This is departure control. You are cleared to climb, unrestricted."

"Copilot," said Dave, "ask him to verify that 'unrestricted' business. That's a wierd clearance for departure control to give someone. And it's your airplane,copilot. I need a break after that last approach."

"Roger, sir, it's my airplane, and we're climbing."

Chuck looked bleakly around the room. Colonel Gannet was rubbing one hand over his eyes. The doctor stood nearby sadly shaking his head. A nurse moved around Chuck, getting ready to pull the sheet up over his body.

"Wait," Chuck said slowly, "look at his hands and face."

The wing commander stared down.

Dave's fists were relaxed, his face calm, showing no signs of the previous tensions.

"Whatever it was, it's over now," reflected Colonel Gannett, as he turned slowly and left the room.

ABOUT THE AUTHOR:

A graduate of Virginia Polytechnic Institute with a degree in business management, Major James E. Mrazek, Jr. had a initial tour in Vietnam in U-10's following UPT at Reese AFB, Texas. He has also flown T-29's, C-131's, C-141's and OV-10's with a total flying time of 3,600 hours. Major Mrazek is presently assigned to the Analytical Studies and Plans Division at HQ MAC, Scott AFB, Illinois.

MAC INDIVIDUAL FLYING-HOUR MILESTONE AWARDS

10,000

Lt Col John F. Bartosh, 41 MAS
Lt Col Peter J. McDonough, 55 WRS
Lt Col William M. Toney, 71 ARRS
Lt Col Harry Van Voorhis, 1 MAS
Maj David A. Blessing, 707 MAS
Maj John F. Rabb, 707 MAS
SMSgt Kenneth D. Witkin, 1 MAS
MSgt Viktor Fink, 707 MAS
MSgt Joseph D. Finn, 300 MAS

5,000

Col John Billings, 6 MAS
Col William D. Forsythe, 21 TAS
Col Floyd E. Hargrove, 21 TAS
Col Paul E. Landers, 6 MAS
Lt Col Donald R. Danborn, 58 MAS
Lt Col Clifford Steger, 1 MAS
Maj William S. Andes, Det 2, 1401 MAS
Maj Paul C. Connors, 1 MAS
Maj David K. Eckert, Det 1, 89 MAW
Maj John D. Ellinger, 1 MAS
Maj Thomas L. Hall, Jr., 58 MAS
Maj Lafayette J. Jones, Jr., Det 1, 89 MAW
Maj William J. Kuhlmeyer, 934 TAG
Maj Richard P. Michaud, 1 MAS
Maj Daniel E. O'Mara, 179 TAG
Maj Stetson J. Orchard, 1 MAS
Maj Michael D. Rankin, 6 MAS
Maj James L. Shafer, 187 TAS
Maj Bradley Van Sant, Det 1, 1402 MAS
Maj Gary E. Vice, 76 MAS
Capt John A. Cowgill, 58 MAS
Capt Thomas L. Law, 707 MAS
Capt Christopher Nelson, 1 MAS
Capt Ronald S. Tillotson, Det 1, 89 MAW
Capt Douglas S. White, 41 MAS
Capt John C. Wright, 1 MAS
MSgt Charles R. Cassin, 1 MAS
MSgt Raymond J. Gertner, Det 1, 89 MAW
MSgt Hector R. Hernandez, 68 TAS
MSgt Francisco Oropeza, 1 MAS
MSgt Jarvis L. Owens, 97 MAS
MSgt James P. Truel, 4 MAS
TSgt David L. Brock, 707 MAS
TSgt Dennis Christorfaro, 1 MAS
TSgt Ross L. Davis, 6 MAS
TSgt Ralph E. Griggs, 6 MAS
TSgt Neil J. McClane, 97 MAS
SSgt Steven G. Estelle, 58 MAS
SSgt Larry L. Lange, 36 TAS

2,500

Capt Richard S. Foley, 1 HS
MSgt Bernice E. Monk, 1 HS

(ranks and units are those at time of award).

Prestwick International Airport
United Kingdom (elevation: 66 feet)

DEJAVU

Located in western Scotland, Prestwick International Airport is 23 miles southwest of Glasgow. Prestwick has two runways. Runway 13/31 is 9,800 feet long and 151 feet wide and is the primary runway at the airport. Runway 03/21 is 6,001 feet long and 200 feet wide. Parallel taxiways are to the south and west.

Prestwick is located on flat terrain 1 mile from the coast. A hill, 22 miles northwest rises to 2,868 feet MSL and is the highest point within 25 miles of the field. A tower, 590 feet MSL, is located 2 miles north of the field.

Instrument approaches include ILS, localizer NDB and ASR for the runways. Although there are no DOD published approach plates for Prestwick, radar instrument approach minimums for Prestwick are published in the FLIP European high and low altitude approach books. Aircrews should obtain Jeppesen approach plates for Prestwick prior to departure from home station.

Prestwick is suitable for C-5, C-141 and C-130 aircraft. Airlifters should consult the 21 AF airfield restrictions before landing at this airport. Aircrews who spot airfield changes not included in the airport qualification programs should notify MACAF/DOTs so they may update these programs.

—Adapted from AQP 51435

On short final, runway 31.

On short final, runway 13. The passenger terminal parking ramp is to the right.

Runway 13. A go-around presents little hazard.

C.R. TERROR

The Magic Major misses the mark in thunderstorm avoidance.

"You get the weather, Sammy m'lad, and I'll file," prompted the Starlifter Sultan, obviously intent on spending minimum ground time at Doverton. "Remember, Sam. 'Time and tide waits for no--' "

"Can do, Boss," interrupted Long Suffering Sam. "By the way, sir, can you pick up an extra copy of the North Atlantic tracks, please?" requested the concerned copilot. "On my last flight our AC lost the crew's only copy."

"Can do easy, GI. I'm on my way to the command post window right now," bantered the Magnificent Major as thoughts of a couple of chili dogs smothered in onions smoldered in his otherwise arid brain. "Snack bar in 20 minutes, and no excuses this time," commanded C.R., thinking ahead toward the world-renown Doverton Globetrotter gourmet snack bar and a plate of gastronomic TNT.

Sauntering up to the steel-barred window, the friendly command post briefer gave C.R. "the word." "Your load is 6 pallets of cargo, Major, and we figured a seat release of 30 pax." The young captain controller was a model of efficiency as he handed an official-looking document through the bars. "Here's a copy of your NAT tracks, sir, but the flight planner at 21st says your computer flight plan has been delayed.

Seems the computer at Global Weather Central went down due to an electrical storm at Offutt. It's back up now but there's a backlog of CFP's to be processed," explained the courteous controller.

"Wonderful. Just wonderful," C.R. observed.

The alert briefer continued, "The flight planner said to use an enroute time of 8.6 hours to Waterstuhl with a flight plan fuel load of 144,000 pounds using Mildenhall as an alter—."

"Thanks for the help," interrupted the NAT Track Wizard. "I'll just whip out a manual routing on the NATS myself," blustered C.R. "Those route management guysup at 21st can't hold a candle to my flight planning prowess."

The Magic Major pulled out his dog-eared, chili-stained, 4-year-old carbon copy of a DD Form 1801 flight plan and began

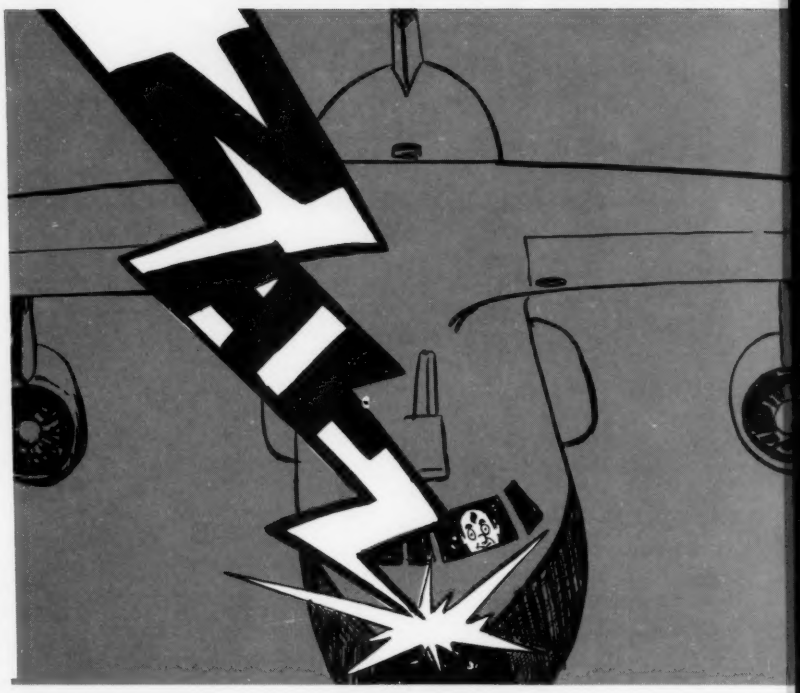
to fill out the remaining missing blanks.

"Let's see, according to this," C.R. mumbled to himself, "NAT 'C' from Shanwick Oceanic coasts out at Gander VOR and coasts in on the sunny Emerald Isle at Dublin VOR." Licking the dull point of the stubby pencil, C.R. continued scribbling on his problematical route of flight.

The Silver-tongued Fox continued his commentary with the nearest post in the flight planning room, "Let's see, 52° North latitude oughta be far enough north for the ocean crossing and flight levels available should be 310, 330, 350 and 370." The NAT-track Nitwit quickly filled in radar vectors to Nantucket, North American route 121 to Gander, NAT "C" to Dublin, and standard European routing to Waterstuhl. He then scrawled in FL 330 and Mach .74 to complete the form. Unfortunately the Mercurial Major penned his name in the wrong block for his signature. It was also wrong on his "crib" copy.

Long Suffering Sam meanwhile gathered the weather information. "Boss, weather's good at destination but there's an area of few thunderstorms around 20° West longitude with tops to FL 310."

"Merely a figment of the weatherman's imagination, Sammy m'lad, and we'll be winging our way well above them, anyway," the Portly Pilot revealed as he washed down a mouth full of mixed nuts with a generous gulp of "Burpo" soft drink. "And besides, I already checked with World Weather Rundown on TV back home and there's no weather out there.



They're always right, ya know," the Ace of Airlift affirmed. "Of course," C.R. continued, "thunderstorms can sometimes be a wee bit of a problem. I remember back a few years ago flying through Hurricane David. Those CB's didn't hurt me any, but the hail sure peppered my plane. Come to think of it, maintenance wasn't too thrilled with the damage to the radome caused by those multiple lightning strikes either, but I figure it comes with the territory."

"I'll be glad to check your 1801 and your fuel planning, sir," hinted the right-seater.

"Nonsense, Sammy. Can't afford to get behind the chli dog curve, ya know," C.R. insisted as he dropped off the flight plan with the base ops dispatcher and charged into the Globetrotter snack bar.

With the help of a good loading crew and a fast but safe refueling operation, C.R. was actually able to break his long string of delayed departures. He managed to get airborne from Doverton a full 2 minutes ahead of schedule. After passing 10,000 feet Sergeant Ty Downs kindly offered the flight deck crew some hot coffee.

"Engineer, pilot, give us a little heat, please," complained the Rhinestone Flyboy whose preference for heat was about 30° warmer than the rest of the crew.

"Comin' at ya," pledged Sergeant Max Torque from the engineer's station. Knowing Major Terror's propensity for higher temps, the efficient engineer barely moved the temperature controller.

The Rotund One asked Sam to

take the first leg while he caught up on his technical readings on Oklahoma-Instruments-brand home computers. After level-off at FL 330 C.R. was finally overcome by the detailed brochures and sank silently into a solid sleep.

About 35 minutes out of Gander VOR, Moncton Center called, "MAC 013, Gander Oceanic advises NAT 'C' is for westbound traffic only. However, FL 290 and FL 390 are available for eastbound. State intentions, over."

"Moncton Center, MAC 013, standby," called Sammy. The now worried right-seater found the NAT message in C.R.'s flight jacket and looked in disbelief. Center was right, the Field-grade Fumbler had actually filed them on the wrong NAT for eastbound traffic.

"Sergeant Torque," Sammy asked, "can we make FL 390 in the next 35 minutes?"

"Sorry sir," replied Torque, "not for another 90 minutes." The flight engineer checked his performance data and fuel log and added, "But we're fat city on gas even at FL 290."

With thunderstorms forecast for the track up to FL 310 Sam was hesitant about flying at FL 290 below NAT "C" with no chance to climb to get on top of the weather.

"Moncton Center, how about track 'D' for FL 330?" queried the copilot.

Some minutes later a clearance was relayed to MAC 013 from Gander Oceanic which cleared the flight on track "D" coasting out at St. John's VOR, Newfoundland and proceeding to Quimper VOR, France. The competent right-seater woke up the dozing AC to help with the new clearance from Quimper to their destination in Germany.

"Sammy m'lad, I'm glad you're getting this practical experience on enroute deviations," explained C.R. as he pulled out his European FLIP charts. "Back before we had the INS, the nav would have gone crazy having to redraw his charts, come up with new mag courses, and then keep the old 'lifter on course. By the way Sammy, can you get some new ETA's for our new route and reprogram the inertials? You've got to keep up with the airplane, ya know." The Rotund One, meanwhile, was able to tune in armed forces radio on one HF radio to catch up on the latest baseball scores.

As the MAC wayfarers approached 25° West longitude the forecast thunderstorms for their previous route had also managed to sneak down to track "D." Major Terror, fiddling idly with the recently installed color weather radar, inadvertently started picking up returns at 80 miles out.

"Boss, looks like this line of thunderstorms is right on our course. And from those flashes ahead, looks like they're well abcve our flight level. I can call Croughton radio with a request to deviate 40 miles south for weather," briefed the right-seater trying to avoid the oncoming weather.

"Sammy m'boy, we're already 30 minutes behind flight plan time since you decided to change my routing. Let's get a little closer before we make any rash decisions. There's probably a break in the clouds up there anyway," insisted the Errant Aviator.

As the Starlifter approached the threatening buildups the sky exploded with light arcing across the heavens. "Zap!!" thundered the lightning bolt as the radome took a first hit, then the loud, booming sounds of multiple lightning strikes reverberated through the aircraft. Suddenly a violent updraft grabbed the huge aircraft like a toy and lifted it 1,000 feet.

Sammy requested an emergency climb to FL 410 in an attempt to clear the tops of the menacing weather. After the clearance was received, C.R. finally realized his predicament, added power and pulled back on the yoke. The Starlifter barely cleared the tops of the storm at FL 400.

"That wasn't too bad," explained the left-seater with beads of perspiration dropping off his forehead. "That second line of thunderstorms behind the first was something of a surprise though. Well, Sam, talk about another good experience for you. You know the Air Force thunderstorm avoidance criteria was written for our safety. I'm sure the next time you won't wait until it's almost too late to climb before these storms are on top of us," explained the Nemesis of Flying Safety, obviously thinking the best defense is always an "offensive" attack.

Sammy, scratching his head, and feeling wrongfully chastised started to point out a few facts to the Wayward Warrior. But after reflecting for a moment and considering the source of this calumny, he merely sighed, "Yes, Boss, I'll try to remember that. I definitely will."

Go-Around

One of our "new" stretched models was on final approach to an Asian air base and was "cleared to land." In the same transmission the tower controller also advised the crew a light aircraft had just landed on the runway, but would be clear prior to the Starlifter's landing. Three times prior to the runway threshold the persistent B-model copilot asked if the light aircraft was indeed clear of the active, and three times the tower advised the crew the light plane was still on the runway. As the C-141B approached the runway threshold, the crew still had not seen the "phantom flyer," and wisely executed a missed approach. After radar vectors to a PAR, the crew landed without further incident. In this go-around the crew was better safe than sorry. This example should remind us all to *practice prior planning on every approach.* (*See "Landing Expectancy"* TMF, *Dec 81*).

A "Humm-dinger"

Reference the young Nightingale crew on a local day training mission. While on radar downwind at the "home drome," they noticed a low frequency humming sound. At this time, the left engine had been retarded simulating a single-engine approach and the right engine EPR was around 1.6. The jumpseat pilot perused the cabin to insure no one was giving their rendition of "The Flight of the Bumble Bee" and returned to the cabin to report no singing groups on board. All other engine instruments were normal and only moving the number 2 throttle aft had any quieting effect on the pervasive "hum."

As the C-9 approached ¼ mile final, the alert tower operator passed word to the aircraft through the PAR controller that the C-9 was trailing smoke. Just as the aircraft began the prelanding flair, the jump-seater saw the oil quantity for number 2 rapidly decrease. As reverse thrust was applied on touchdown, the master caution and low-oil pressure annunciator lights came on. As the engine was shutdown prior to leaving the runway, the oil quantity showed "0" and oil pressure was between 25 and 30 psi. Later inspection revealed this "humdinger" of a shutdown was caused by a broken oil feed line to the number 2 engine.

Lightning Strike, Anyone?

It's the time of year again when thunderstorms will abound in all quadrants. We selected a few electrifying encounters MAC crews have had—when they least expected it.

Over Alabama at 20,000 feet OAT: -14C

This H-model was participating in a joint Army/Air Force exercise and was enroute to one of the exercise's "aux fields." The radar had been written up in the AFTO 781 as having weak returns but the write-up was still open when the aircraft took off for the exercise off-load base. Even though the radar had weak returns, it didn't detect any buildups or heavy rain. After inadvertently entering an embedded thunderstorm in IMC, the C-130 was struck by one bolt on the radome. Total damage to the radome and radar was in excess of $15,000.

Over Germany at 6,500 feet OAT: +3C

An E-model on a corridor mission was outbound from Templehof in IMC when the crew began picking up "light turbulence and light icing." The radar had "painted" no severe weather. Although the crew saw one lightning bolt, they didn't realize they had taken a lightning strike until they landed. The radar antenna and radome were damaged to the tune of around $5,000.

Over Thailand at 24,000 feet OAT: -8C

In rain and light turbulence at cruise altitude, the C-130E and crew were 20 miles from the nearest buildup when they took a lightning strike. Again the crew noted no damage until they landed when they discovered two pin holes in the radome and two 2-inch squares of delamination inside the radome. Total damage was over $800.

As these brief incidents illustrate, lightning can strike almost anytime, anywhere. Your best chance to avoid a lightning strike is to avoid thunderstorms. MAC crews, however, have to fly in every kind of weather and should be aware of the avoidance criteria listed in the appropriate MACR 55-XXX and 60-16. Generally, 95 percent of lightning strikes occur below 20,000 feet and within $\pm 8°C$ of the freezing level. The best advice is to stay aware to stay alive.

NOTABLE QUOTE

Thunder is good.
Thunder is impressive.
But it is *lightning* that does the work.

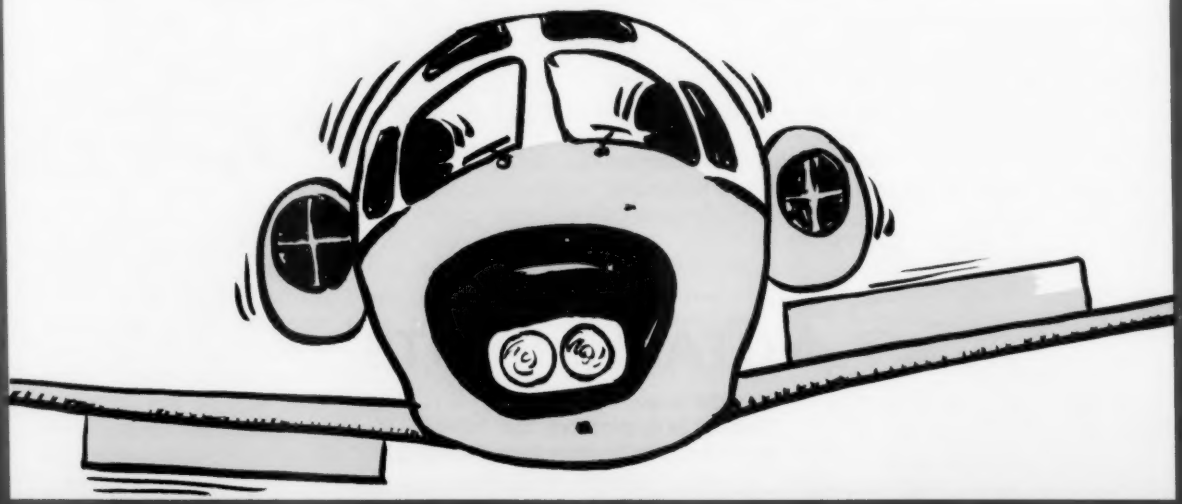
Mark Twain, 1908.

Double Jeopardy

Almost 12 hours into a 14-hour crew duty day, the Sabreliner crew was about to complete a "no-sweat" night PAR in VMC. Flying from the right seat, the aircraft commander started lowering the flaps while he entered a controller-directed right turn. He immediately had to counteract a left rolling tendency and quickly moved the flap handle to "hold." Even though the flap indicator read "0" degrees, the pilot suspected split flaps and a quick visual scan of the wings verified it: the left flap was up and the right one partially down. As he checked the aileron's for binding, the pilot gradually worked the flakey flaps up. With control pressures now normal, the pilots prepared for a no-flap landing.

So far, so good and the whole thing could have ended with an uneventful no-flap landing were it not for a too-firmly ingrained habit pattern. As the flapless 'liner turned a 5-mile final, the pilot, following a familiar sequence, moved the gear handle down, *then immediately lowered the flap handle—again!* This time he didn't catch the asymmetrical movement as quickly because of the changing control forces. The gear, you see, was in transit and the miniliner was in another controller-directed right turn. And again the right flap moved down and the left one stayed up. But this time the right one wouldn't retract. The crew maintained 150 knots on final, touching down at 135 knots. The remainder of the mission from landing to engine shutdown went smoothly.

There are basically two causes for this little incident. First of all the right-hand flex shaft failed due to excessive corrosion within the interconnect cable. Human factors in the form of awareness, *or lack of awareness, and technique* were also at work here. There are several tried and proven techniques to minimize the dangers associated with split flaps. Lowering the flaps only when in straight and level flight and keeping one's hand on the flap lever until all movement stops are two of them. Staying aware of the situation requires mental discipline. Habit patterns are necessary in any complicated motor skill, including flying. But a lack of awareness and failure to mentally keep a handle on our flight situation, especially in unusual circumstances, can spell trouble with a capital "T".



AFTER DEADLINES

FLYING SAFETY WEEK, 17-21 MAY 1982. The Air Force-wide program will kick off next month and MAC units are planning a variety of activities to promote and increase safety awareness. Plan to participate. The May issue of TMF will highlight Safety Week '82.

MAC UNITS/PEOPLE NOMINATED FOR AIR FORCE SAFETY AWARDS. A number of MAC units and individuals have been nominated for 1981 Air Force safety awards. MAC's nominees for the System of Cooperation Among the Air Forces of the Americas (SICOFAA) Flight Safety Award were the 39th ARRW and the 60th MAW. Major Joseph C. Reichal, Jr., 834th ALD, and Mr. Richard A. Squitiero, GS-11, 463d TAW, were MAC's nominees for the Chief of Staff Individual Safety Award. The 436th MAW was nominated by MAC for the Director of Aerospace Safety Special Achievement Award. For the Koren Kolligian, Jr. Trophy, MAC has nominated Captain John D. Hauck, Jr., 30th MAS, and Captain Randy E. Honnet, 50th TAS. The Koren Kolligian Trophy is given to recognize outstanding feats of airmanship by individual aircrew members. The winners from the Air Force Safety Awards Board will be announced later in the year.

CONGRATULATIONS TO LT COL BART C. HOGAN, former Chief of Safety of the 60th MAW. Colonel Hogan took command of the 7th MAS at Travis AFB, California in early March.

C.R. TERROR WANTS YOU--to be the editor of the world's greatest flying safety magazine, The MAC Flyer. That's right, we're looking for a newly-minted rated major for the Supervising Editor's job starting July 1982. A strong desire to write and talent to manage MAC's Safety Education and Awards Division is essential. A journalism, public relations background or equivalent, plus flying safety experience are definite assets. If it sounds good (and it is!), write to: Director of Safety, HQ MAC/IGF, Scott AFB, Illinois 62225, or call autovon 638-3528.

C-5 WING MODIFICATION MOVES INTO PRODUCTION PHASE. The first C-5A aircraft scheduled for wing modification during regular production is now at the Lockheed-Georgia Company, Marietta, Georgia. Input of the initial C-5A, 67-0173, 28 January 1982, began a program which will see all Galaxy aircraft modified by July 1987. The wing mod will remove current operating restrictions from the C-5A fleet and extend the useful service life of each aircraft. The first aircraft is scheduled to be returned to MAC after 13 months. When the program reaches maximum production rate with the input of the 16th aircraft in June 1983, aircraft will be returned to MAC every one and a half months. Information courtesy of SA-ALC/MMSG.

☆ U.S. Government Printing Office: 1981-564-017/12

Touch 'n' Go

Dad says you can get 5,000 hibachi pots in it.